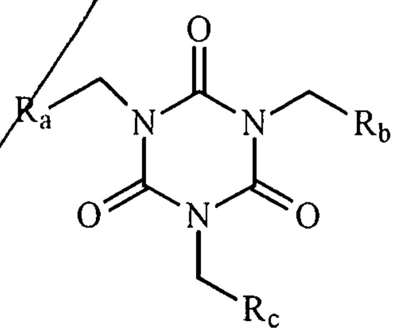
CLAIMS

We claim:

1. An electronic device comprising a first polymer derived from a monomer having the formula:



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wherein each of R_a, R_b, R_c are independently selected from the group consisting of: a hydroxylated aliphatic side chain; an epoxy glycol; an ethoxy ether; a glycol ether; an adduct of glycol ether or a bisphenol glycol epoxy; an adduct of an epoxy glycol and an amine such as oxydianiline to form a hydroxylamine; an adduct of a glycol ether and a cycloaliphatic epoxy; and an adduct of hydroxyethyl side chain and a cycloaliphatic epoxy.

2. The device of claim 1, wherein the first polymer further comprises an oxybis(cyclopentene oxide) group.

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3. The device of claim 1 wherein the first polymer further comprises an oxydianiline group.

4. The device of claim 1 wherein the first polymer further comprises a bisphenol A glycidyl Epoxy group.

5. The device of claim 1 wherein the first polymer further comprises a bis 3,4 epoxycyclo-hexylmethyl adipate group.

6. The device of claim 1 wherein the first polymer further comprises a trishydroxy-ethylisocyanurate.

7. The device of claim 1 wherein the electronic device further comprises an interface between the first polymer and a substrate.

8. The device of claim ~~1~~ 7 wherein the electronic device comprises an interface between the first polymer and a second polymer.

9. The device of claim 8 wherein the first polymer and the second polymer are chemically different from one another.

10. A method of forming an interface between a polymer and a substrate comprising:
modeling a plurality of structural characteristics of a plurality of candidate interfaces by calculating a strain required to separate the first polymer of claim 1 from a substrate for each of the plurality of candidate interfaces over at least 1000 strain cycles;
selecting a relatively superior interface from the plurality of candidate interfaces;
obtaining a plurality of materials required to produce the first polymer and the substrate;
using the plurality of materials to produce the first polymer and the substrate; and
coupling the polymer and the substrate to form the interface.

11. A method of forming an interface between the first polymer and a second polymer comprising:
modeling a plurality of structural characteristics of a plurality of candidate interfaces by quantitatively determining a strain required to separate a first polymer of claim 1 from a second polymer for each of the plurality of candidate interfaces over at least 1000 strain cycles; and
selecting a relatively superior interface from the plurality of candidate interfaces;
obtaining a plurality of materials required to produce the first polymer and the second polymer; and
using the plurality of materials to produce the first polymer and the second polymer;

coupling the first polymer and the second polymer to form the interface.

12. A computer-assisted process for estimating durability of an interface between a polymer and a substrate comprising:
selecting a candidate combination of the first polymer of claim 1 and a substrate;
modeling the polymer and the substrate;
modeling the polymer and the substrate as being adhered to one another;
modeling an intermittently applied force to the polymer and the substrate; and
calculating a plurality of cycles of the intermittently applied force to the polymer and the substrate that is required to disrupt the interface.

13. The computer-assisted process of claim 12 wherein the modeling of an intermittently applied force further comprises controlling a strain distance achieved.

14. A computer-assisted process for estimating durability of an interface between a first polymer and a second polymer comprising:
selecting a candidate combination of the first polymer of claim 1 and a second polymer;
modeling the first polymer and the second polymer;
modeling the first polymer and the second polymer as being adhered to one another;
modeling an intermittently applied force to the first polymer and the second polymer; and
calculating a plurality of cycles of the intermittently applied force to the first polymer and the second polymer that is required to disrupt the interface.

15. The computer-assisted process of claim 14 wherein the modeling of an intermittently applied force further comprises controlling a strain distance achieved.

16. A computer-assisted method for generating a dynamic model of an interface between a polymer and a substrate, comprising:
visually modeling an atomic representation of the polymer adhered to the substrate at the interface by a force;
including molecular strain-related information into the model; and
using the model to generate data for said polymer/substrate interface, said data including:

a number of strain cycles that separates the polymer from the substrate;
a magnitude of strain that separates the polymer from the substrate; and
a magnitude of the force between the polymer and the substrate.

17. The computer assisted method of claim 16 further comprising normalization of the strain using an interaction cross section normal to a force vector, and a one-cycle translation predicted using extapolation of a plurality of smaller one-cycle strains.

18. The computer assisted method of claim 16 further comprising a multiple cycle extrapolation that comprises:
modeling at least two set strain targets;
calculating a plurality of cycles of the intermittently applied force to the polymer and the substrate that is required to disrupt the interface such that the strains are normalized against the active cross-sections normal to the force vector and the ultimate one-cycle translation;
plotting the log of the number of cycles to failure at each set strain against the log of the set strain;
approximating a linear line; and
determining the strain represented by a desired number of cycles off of the extrapolation of the linear line.

19. A computer-assisted method for generating a dynamic model of an interface between a first polymer and a second polymer, comprising:
visually modeling an atomic representation of the first polymer cohered the second polymer at the interface by a force;
including molecular strain-related information into the model; and
using the model to generate data for said polymer/polymer interface, said data including:
a number of strain cycles that separates the first polymer and the second polymer;
a magnitude of strain that separates the first polymer and the second polymer; and
a magnitude of the force between the first polymer and the second polymer.

20. The computer assisted method of claim 19 further comprising normalization of the strain using an interaction cross section normal to a force vector, and a one-cycle translation predicted using extapolation of a plurality of smaller one-cycle strains.

21. A model for evaluating a candidate polymer/substrate interface, comprising:
a plurality of candidate polymer/substrate or candidate polymer/polymer interfaces wherein the polymer is selected from the first polymer of claim 1;
software that executes on a computer that manipulates a set of evaluation data, including a plurality of adhesive characteristics, a plurality of strain variables, and estimates of their effect on the interfaces; and
an output device operatively coupled to the computer that outputs the evaluation data.